

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Wen Tong et al.

Serial No. 10/792,127

Filed: 03/04/2004

Examiner: Burd, Kevin Michael

Art Unit: 2611

For: **COMMUNICATION CHANNEL OPTIMIZATION SYSTEMS AND METHODS  
IN MULTI-USER COMMUNICATION SYSTEMS**

Mail Stop Amendment  
Commissioner for Patents  
PO Box 1450  
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Sir:

**PRE-APPEAL BRIEF REQUEST FOR REVIEW**

The current remarks provide the succinct and focused arguments for which review is being requested and accompany the concurrently filed Notice of Appeal. Claims 2-4, 6-8, 10-13, 15-28, 32-43, 48-55 and 57-60 are the subject of this Pre-Appeal Brief Request For Review. Claim 5 is allowed. Claims 9, 14, and 44-47 have been deemed to contain allowable subject matter.

Claims 2-4, 6-8, 13, 15-20, 22, 26-28, 32, 34, 35, 38-43, 48-55, and 57-60 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,873,606 B2 to Agrawal et al. (hereinafter "Agrawal"). Applicant respectfully traverses. For a reference to be anticipatory, the reference must disclose each and every claim element. M.P.E.P. § 2131.

Agrawal fails to teach each and every element of independent claim 16. To summarize, in claim 16, the pre-coding signal weights are based on channel state information associated with the plurality of communication channels, and the decoding is done on subsets of the received weighted signals using inverses of the pre-coding signal weights based on the channel state information associated with the sub-group of the plurality of communication channels. Agrawal does not teach this method of coding and decoding, where subsets of weighted signals are decoded using inverses of the pre-coding weights that are based on channel state information of only a sub-group of the communication channels. Agrawal fails to disclose the steps of "receiving a subset of the weighted signals over a sub-group of the plurality of communication channels" and "decoding the subset of the weighted signals using inverses of the pre-coding signal weights based on the channel state information associated with the sub-

group of the plurality of communication channels,” at each of the receivers, as recited in claim 16.

The Patent Office alleges that Agrawal discloses receiving a subset of weighted signals over a sub-group of the plurality of communication channels in that the subset and sub-group is a number equal to or less than the total number of weighted signals and the total number of communication channels. The Patent Office also states that the signals in Agrawal are coded for transmission using the signal weights and that the receiver will conduct the opposite of the coding process to recover the signal data such that the received signals are decoded using an inverse of the encoding process (Final Office Action mailed October 13, 2009, pp. 2-4). Appellant disagrees that Agrawal discloses that a subset of the weighted signals over a sub-group of the plurality of communication channels is received at each receiver for the reasons set forth in the Responses filed December 18, 2008 and June 24, 2009. Agrawal is silent as to subsets of weighted signals and sub-groups.

Moreover, what the Patent Office’s position ignores is that claim 16 recites that at the receiver, a subset of the weighted signals over a sub-group of the plurality of communication channels and the subset of the weighted signals is decoded using inverses of the pre-coding signal weights based on the channel state information associated with the sub-group of the plurality of communication channels. Agrawal does not disclose that the subset is decoded using inverses of the pre-coding signal weights based on channel state information associated with the sub-group. Instead, Agrawal discloses that the data symbol stream to be transmitted is scaled with a respective weight corresponding to the amount of transmit power allocated to that stream (Agrawal, Abstract). If, according to the Examiner’s position, this symbol stream is decoded at the receiver by conducting the opposite of the coding process, then the symbols in Agrawal will be decoded using the inverse of the weight corresponding to the amount of transmit power allocated to the entire symbol stream. Accordingly, Agrawal does not teach using the channel state information associated with a sub-group of the plurality of communication channels to decode a subset of the received weighted signals at the receiver. There is no indication in Agrawal that the weighted signals are divided into subsets, where a subset of the weighted signals is received over a particular sub-group of the plurality of communication channels, and the subset is then decoded using inverses of the pre-coding signal weights based on the channel state information associated with that particular sub-group. Depending on the

particular sub-group and the channel state information associated with it, dividing the weighted signals into subsets, where a subset of the weighted signals is decoded using inverses of the pre-coding signal weights based on the channel state information associated with that particular sub-group, may result in a different decoding outcome. Since Agrawal does not mention dividing the weighted signals into subsets, where a subset of the weighted signals is received over a particular sub-group of the plurality of communication channels, and the subset is then decoded using inverses of the pre-coding signal weights based on the channel state information associated with that particular sub-group, Agrawal does not teach each and every element of claim 16.

Claims 2-4, 6-8, 15, and 57 depend directly or indirectly from claim 16, and are patentable based on their dependency from claim 16.

Claim 13 is an independent claim that recites limitations similar to those recited in claim 16 and thus is patentable over Agrawal for at least the same reasons set forth above with respect to claim 16. Moreover, the Patent Office has not pointed with particularity to any portion of Agrawal that discloses “wherein the signals comprise respective groups of signals to be transmitted to the receivers, wherein determining the pre-coding signal weights further comprises determining the pre-coding signal weights to separate the respective groups of signals,” as recited in claim 13. Agrawal is silent as to separating the respective groups of signals by determining the pre-coding signal weights. Claim 13 is therefore patentable for this additional reason. Furthermore, the Patent Office has not pointed with particularity to any portion of Agrawal that discloses “wherein determining the pre-coding signal weights comprises determining elements of a pre-coding matrix  $P$  such that a combined communication channel matrix  $C = HP$  has a form of  $U$   $N \times N$  sub-matrices, diagonal elements of which are respective diagonal elements of  $C$ , and elements of  $C$  outside the  $N \times N$  sub-matrices are forced to zero,” as recited in claim 13. Agrawal does not disclose  $U$  number of  $N \times N$  sub-matrices. Claim 13 is therefore patentable for this additional reason.

Claim 17 has limitations similar to those recited in claim 16. Thus, claim 17 is also patentable over Agrawal for at least the same reasons set forth above with respect to claim 16. Claims 18-20, 22, 26-28, and 58 depend from claim 17 and include all of the limitations of claim 17. Claims 18-20, 22, 26-28, and 58 are thus patentable over Agrawal for at least the same reasons set forth above with respect to claim 17.

Independent claims 32 and 35 have similar limitations to those recited in claims 16 and 17 and are patentable for at least the same reasons as set forth with respect to claims 16 and 17.

Claims 34 and 59 depend from claim 32 and include all of the limitations of claim 32. Claims 38 and 60 depend from claim 35 and include all of the limitations of claim 35. Claims 34, 38, 59, and 60 are patentable over Agrawal based on their dependency from claims 32 or 35.

With respect to independent claim 39, Agrawal does not teach “determining a spatial coding matrix comprising **a respective set of spatial coding weights for each of the receivers based on the channel state information**” and “applying the respective set of spatial coding weights in the spatial coding matrix to the signals.” Claim 50 is an independent claim and contains similar limitations to the limitations in claim 39. In particular, claim 50 recites “receiving from the transmitter one of a plurality of demodulation matrices for demodulating subsequently received communication signals to which spatial coding weights comprising **respective sets of spatial coding weights for a plurality of receivers** have been applied.” Claim 52 is an independent claim and contains similar limitations to the limitations in claims 39 and 50. In particular, claim 52 recites a processor configured to determine channel state information for each of a plurality of communication channels between the network element and the plurality of communication terminals, to determine a spatial coding matrix comprising **a respective set of spatial coding weights for each of the plurality of communication terminals** based on the channel state information, and to apply the respective set of spatial coding weights in the spatial coding matrix to the signals. The Patent Office has not cited to any portion of Agrawal that discloses determining a spatial coding matrix comprising **a respective set of spatial coding weights for each of the receivers** based on the channel state information, as recited in claim 39. Agrawal discloses matrices, but the Patent Office has not cited to any particular portion of Agrawal that teaches a spatial coding matrix comprising a respective set of spatial coding weights for each of the receivers. There is no teaching or suggestion in Agrawal that there is a respective set of spatial coding weights **for each of the receivers**. Claims 39, 50, and 52 are thus patentable over Agrawal.

Claims 40-43, 48, and 49 depend from claim 39 and include all of the limitations of claim 39. Claim 51 depends from claim 50 and includes all of the limitations of claim 50. Claims 53-55 depend from claim 52 and include all of the limitations of claim 52. Claims 40-43, 48, 49, 51, and 53-55 are patentable over Agrawal based on their dependency from claims 39, 50, or 52.

In addition, the Patent Office has not indicated what in Agrawal is equated to the claimed beamformers in claim 54. Accordingly, claim 54 is patentable for this additional reason.


Claims 10-12, 23-25, 33, 36, and 37 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Agrawal in view of U.S. Patent Application Publication No. 2005/0053170 A1 to Catreux et al. (hereinafter "Catreux"). Claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Agrawal in view of U.S. Patent No. 5,828,658 to Ottersten et al. (hereinafter "Ottersten"). To establish *prima facie* obviousness, the Patent Office must show where each and every element of the claim is taught or suggested. M.P.E.P. § 2143.03.

Claims 10-12 depend from claim 16 and contain all of the limitations of claim 16. Claims 21 and 23-25 depend from claim 17 and contain all of the limitations of claim 17. Claim 33 depends from claim 32 and contains all of the limitations of claim 32. Claims 36 and 37 depend from claim 35 and contain all of the limitations of claim 35. Thus, each of the dependent claims 10-12, 21, 23-25, 33, 36, and 37 are patentable based on their dependency from the allowable independent claims. Neither Catreux nor Ottersten cures the deficiencies of Agrawal in this regard. Catreux is cited merely for its disclosure of interference cancellation. Ottersten is cited merely for its disclosure of the Moore-Penrose pseudo-inverse matrix. Thus, claims 10-12, 21, 23-25, 30, 33, 36, and 37 are patentable.

For the above reasons, the present application is now in condition for allowance and such action is respectfully requested.

Respectfully submitted,

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